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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,390	09/12/2000	Akihiro Nitayama	00629.00002	6915

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EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/660,390

Applicant(s)

NITAYAMA ET AL.

Examiner

Howard Weiss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-12 and 18 ~~is/are~~ are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-12 and 18 ~~is/are~~ are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 18 March 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Attorney's Docket Number: 00629.00002

Filing Date: 9/12/00

Continuing Data: CIP of 08/982,478 (12/2/97) Now U.S. Patent No. 6,236,079

Claimed Foreign Priority Date: none

Applicant(s): Nitayama et al. (Katsuhiko, Ishibashi, Kohyama)

Examiner: Howard Weiss

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 3/18/02 have been accepted. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 12 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Ushiku et al. (U.S. Patent No. 5,675,176).

Ushiku et al. show all aspects of the instant invention (e.g. Figure 10I) including a semiconductor substrate **81** and an element isolation insulating film including a first insulating film **85** buried to define an active element area and a second insulating film **94** shallower, wider and position over the first film and contact layer **93** formed underneath the second insulating film and beside the first insulating film.

4. Claims 2 and 6 to 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Park et al. (U.S. Patent No. 5,521,115).

Park et al. show all aspects of the instant invention (e.g. Figures 2 to 10) including:

- a semiconductor substrate **10**
- a plurality of trench capacitors with node layers **55** and arranged at a regular pitch
- a semiconductor layer comprising a first layer **32** and a second layer **58** formed on said first layer
- an element isolation insulating film **30** buried in said semiconductor layer and defining active element areas over two adjacent trench capacitors
- two transistors **14** which share one **18** source/drain diffusion layer and an other **20** source/drain layer and positioned over regions **32** of two adjacent trench capacitors
- each transistors' gate **16, 62** connected a word line continuous in one direction
- a contact layer **26** for connecting the other source/drain layer to the node layers and bit line contacts **78**

Park et al. do not explicitly show bit lines intersecting the word lines. However, it is common in the art to form bit lines to intersect word lines and Park et al. generally state that it is left to one of ordinary skill to construct such lines (Column 8 Lines 54 to 61).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 11 is rejected under 35 U.S.C. § 103(a) as obvious over Park et al. in view of Bronner et al.

Park et al. show most aspects of the instant invention (Paragraph 4) except for the substrate isolation insulating film made of two films as claimed. Bronner et al. teach (Paragraph 12) to make two layer isolation films as claimed to allow scalability below 2 volts (Column 1 Lines 43 to 45). It would have been obvious to a person of ordinary skill in the art at the time of invention to make two layer isolation films as taught by Bronner et al. in the device of Park et al. to allow scalability below 2 volts.

7. Claims 3 to 5 are rejected under 35 U.S.C. § 103(a) as obvious over Park et al. in view of Ishii.

Park et al. show most aspects of the instant invention (Paragraph 4) except for the trench capacitors shaped substantially in a square with sides equal to $2F$, either the diagonals or the sides of said squares being oriented in two orthogonal directions of said word and bit lines and arranged at the pitch as claimed. Ishii teaches to have trench capacitors **8** in a square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word **20b** and bit **20a** lines to achieve high integration of the memory cells in a DRAM (Column 3 Lines 29 to 31). It would have been obvious to a person of ordinary skill in the art at the time of invention to have trench capacitors **8** in a square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word and bit lines as

taught by Ishii et al. in the device of Park et al. to achieve high integration of the memory cells in a DRAM.

In reference to the dimensions of the sides of the trench capacitors, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the dimensions of the trench capacitors equal to the minimum processing dimension, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

8. The Applicants' arguments filed 3/18/02 have been fully considered but they are not persuasive. The Applicants state that Park et al. do not show the source/drain region **20** "positioned over regions of two adjacent trench capacitors" and, in fact, state that the source/drain region is adjacent to the storage node **55**. However, the regions of the trench capacitors includes the storage node plus the dielectric region **28** and the conductive region **32**. All three features make up the trench capacitors' structure and therefore, puts the source/drain region **20** over the capacitors' region.

In reference to the dimensions of the arrangement, it is obvious for one of ordinary skill in the art to make the dimensions of the trench capacitors equal to the minimum processing dimension for the reasons stated in the rejection (Paragraph 9 above) since making the dimensions small is very desirable in the art. In reference to amended Claim 12 and an new Claim 18, see the revised rejection detailing where the instant invention is detailed in Ushiku et al. (Arguments directed towards cancelled Claim 13 are moot). In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

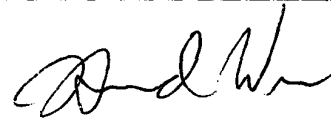
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318**, and After-Final, **(703) 872-9319**, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

12. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/ 301, 305	thru 4/30/02
Other Documentation: none	
Electronic Database(s): EAST, IEL	thru 4/30/02



Howard Weiss
Patent Examiner
Art Unit 2814

HW/hw
30 April 2002